Why do I never get the same result twice?

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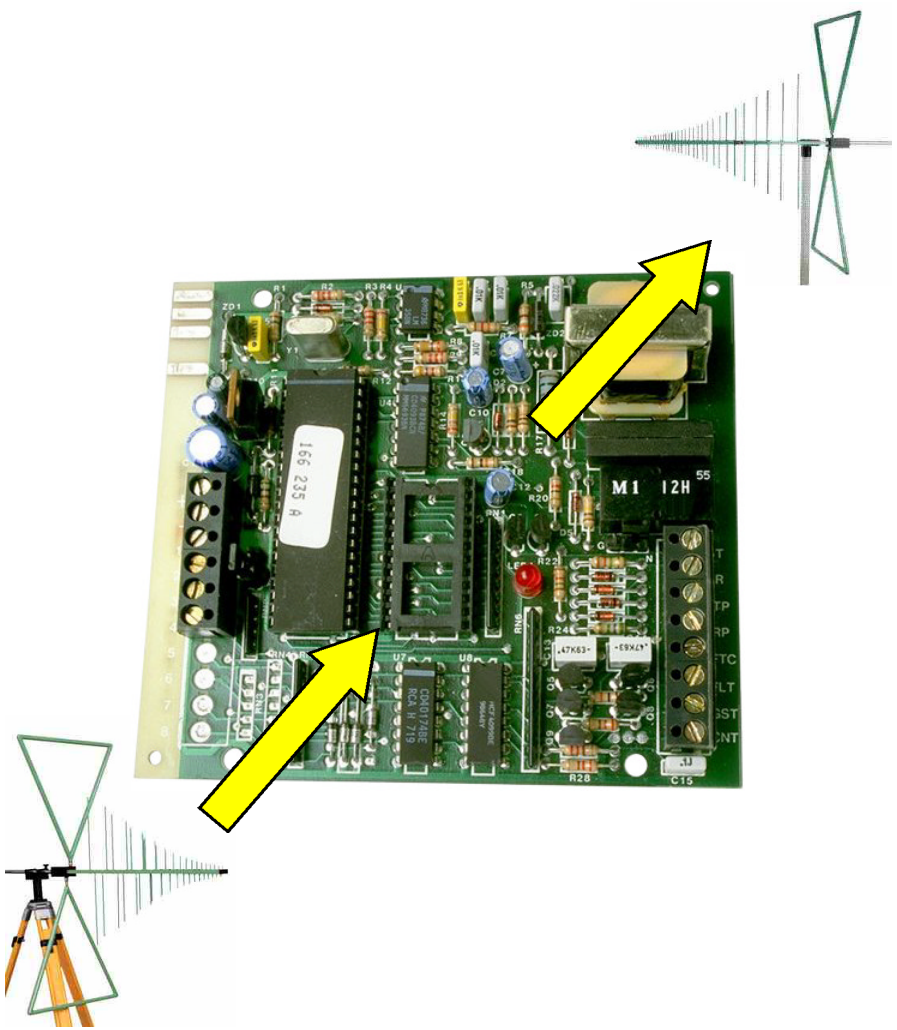
Outline

- EMC testing is inherently unrepeatable
  - Same EUT, different labs
  - Same EUT, same lab, different days
- Why is this?
  - There is no EMC testing connection port
  - Tests must be done in ways for which the EUT wasn't designed
  - RF tests depend on layout and cable parameters
  - standard test methods don't control all necessary parameters

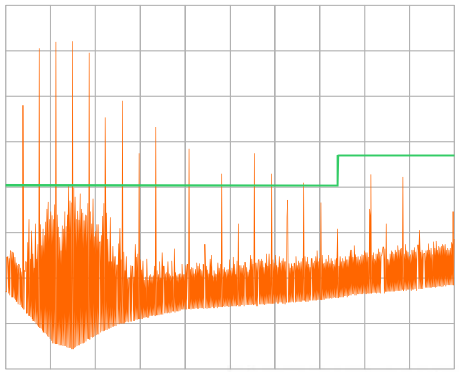
The lack of an EMC test connector



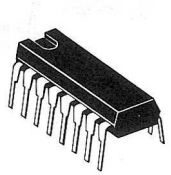
- EUTs are designed for function
- function doesn't include EMC testing, so there is no test connector
- no design control over coupling between EUT and environment

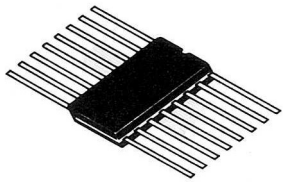
The variability of the EUT: emissions

- EUT operating mode
  - clock speed, display mode

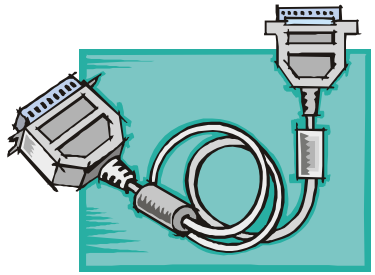


- EUT build state, environment
  - different parts, temperatures





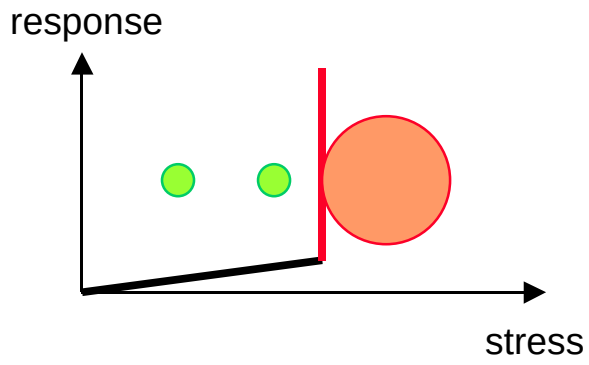
- system configuration
  - wiring layout and termination



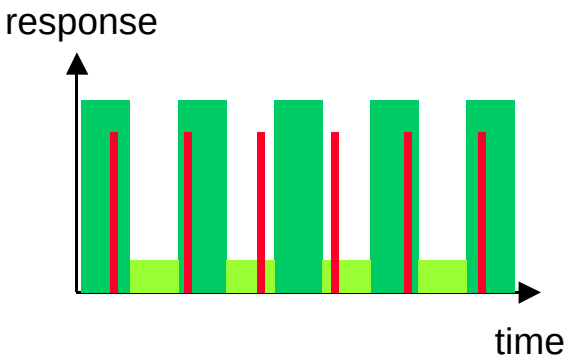
The variability of the EUT: immunity

As for emissions, plus:

- non-linearity of response
  - especially for RF immunity

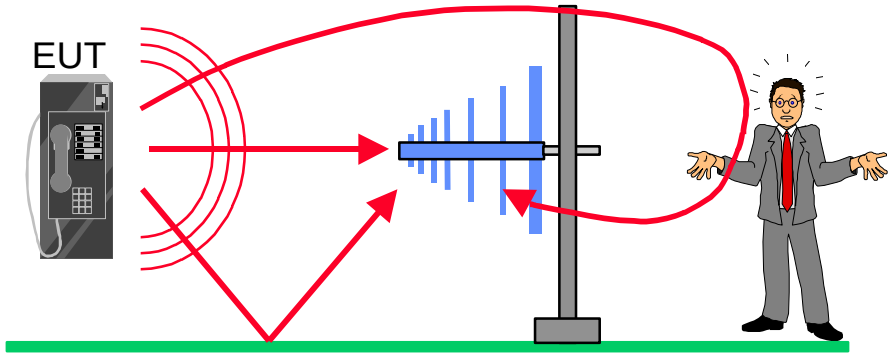


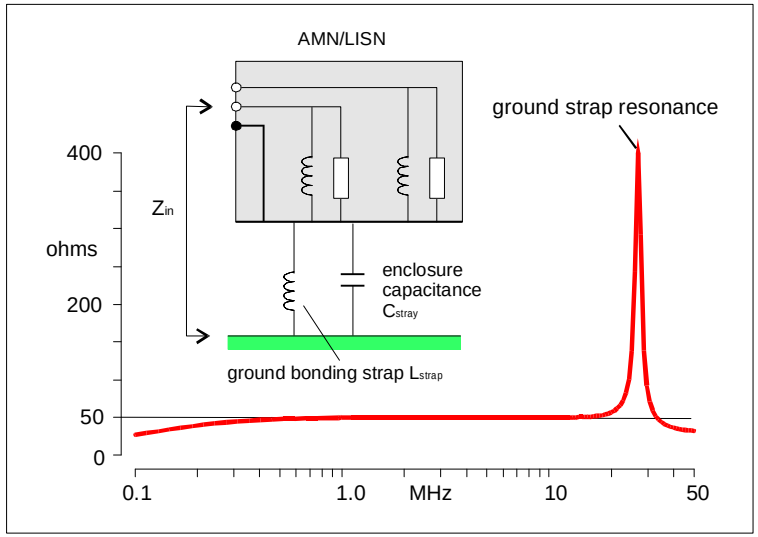
- time coincidence
  - especially for transients



The nature of RF tests

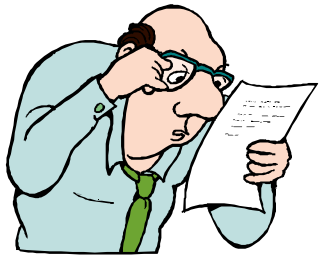
- Field coupling depends on spatial location, orientation and geometry
- Conducted coupling depends on impedances
- Both are affected by stray wiring and structures





Standards that aren't

- IEC and CENELEC committees are fallible
- Standards can be vague, misleading and erroneous
- Test labs can misinterpret them, or use their own interpretation, or apply deviations



What can be done to improve things?

- Read and understand the standard
- Write a test plan before you go to the lab
- Use a lab which knows how to do the tests
- Prepare and know your EUT
- Prepare the support equipment and cables
- Make sure the test setup is recorded in all particulars

End